IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No.:	10/710,947	**Conf. No.:**	4946
Filing Date:	08/13/2004	**Art Unit:**	2858
Applicant:	Chudzik et al.	**Examiner:**	He, Amy
Title:	METHOD FOR THE DETERMINATION OF FILM CONTINUITY IN THIN DIELECTRIC FILM	**Docket No.:**	FIS920040092US2 (IBMF-0066)

COMMISSIONER FOR PATENTS

DESTINATION FACSIMILE NUMBER: 571-273-8300

Transmitted herewith is:

- **Petition to Withdraw Holding of Abandonment / Petition to Revive Untintentionally Abandoned Application in 04 pgs.**
- **Incorrect Amendment in 13 pgs. (Exhibit "A")**
- **Correct Amendment in 13 pgs. (Exhibit "B")**
- **Credit Card Payment Form**

in the above identified application.

CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office on the date shown below.

Linda T. Sagarese
(Person transmitting this correspondence)

Signature — January 31, 2007 — Date

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Chudzik et al.	**Conf. No.:** 4946
Serial No.: 10/710,947	**Art Unit:** 2858
Filing Date: 08/13/2004	**Examiner:** He, Amy
Title: METHOD FOR THE DETERMINATION OF FILM CONTINUITY IN THIN DIELECTRIC FILM	**Docket No.:** FIS920040092US2 (IBMF-0066)

Mail Stop Petitions
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

PETITION TO WITHDRAW HOLDING OF

ABANDONMENT UNDER 37 C.F.R. § 1.181(a)

ALTERNATIVELY, PETITION TO REVIVE UNINTENTIONALLY ABANDONED

APPLICATION UNDER 37 C.F.R. § 1.137(b)

Sir:

This Petition is being filed subsequent to the Notice of Abandonment mailed January 9, 2007.

A) Petition to Withdraw Holding of Abandonment:

Applicants submit that the Notice of Abandonment citing Applicants' alleged failure to timely file a proper reply to the Office Action mailed on May 23, 2006 is improper, and respectfully submit:

1) On August 21, 2006, Applicants filed, via facsimile, an Amendment in response to the Office Action.

2) Applicants received an Auto-Reply Facsimile Transmission from the United States Patent and Trademark Office (USPTO) that indicated that the Reply was received on April 21, 2006 at 1:59:26 PM. Applicants also received a transmission report from their own facsimile machine indicating that the transmission was successful. Both documents are attached as Exhibit A.

3) Applicants inadvertently used the wrong series number in the Application Number on the facsimile cover page and the header of the Amendment, i.e., 09 rather than 10. However, all other information was correct on the header of the Amendment, including the art unit, examiner, confirmation number, filing date, applicant, title and docket number. In addition, the correct Application Number appeared in the footer on all pages of the Amendment, including the first page.

4) The incorrect Application Number, i.e., 09/710947, is to US patent number 6,341,083, issued January 22, 2002.

5) According to MPEP §508.03, II, where an unmatched paper has the name of an examiner in the Technology Center (TC), as in the response described above, a careful check of the TC records and files as well as consultation with the indicated examiner should be made to determine the correct application number. Applicants respectfully submit that a careful check of the paper and the TC records should have easily indicated Applicants' error, thus avoiding the abandonment. In particular, the response had the correct Application Number on every page, and the correct title, TC, confirmation number and examiner in the header. Furthermore, the incorrect Application Number is to

an issued patent, which should have caused the USPTO to question the correctness of the Application Number, and carefully checked the paper and the TC records. Applicants' respectfully submit that if this careful check had been completed, then the application would not have been abandoned.

6) A corrected Amendment to the May 23, 2006 Office Action is attached hereto as Exhibit B. Please be sure to avoid using the incorrect Amendment in Exhibit A.

7) In light of the above, Applicants submit that they have timely filed an Amendment in response to the May 23, 2006 Office Action. Accordingly, Applicants request withdrawal of the holding of abandonment in the above-referenced patent application.

B) Alternative, Petition to Revive Unintentionally Abandoned Application:

1) In the event that the above Petition to Withdraw Holding of Abandonment is unsuccessful, then Applicants hereby petition to Revive the Unintentionally Abandoned Application.

2) Applicants hereby authorize charge of the petition fee of $1500 (37 C.F.R. § 1.17(m)) per the attached Credit Card Payment Form.

3) A corrected Amendment to the May 23, 2006 Office Action is attached hereto as Exhibit B. Please be sure to avoid using the incorrect Amendment in Exhibit A.

4) Since the utility application was filed after June 8, 1995, no terminal disclaimer is required.

5) The entire delay in filing the required reply from the due date for the required reply until the filing of a grantable petition under 37 C.F.R. § 1.137(b) was unintentional.

Respectfully submitted,

Spencer K. Warnick
Reg. No. 40,398

Date: January 31, 2007

Hoffman, Warnick & D'Alessandro LLC
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(518) 449-0044
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EXIBIT "A"

USPTO 21/2006 2:03:56 PM PAGE 1/001 Fax Server

:Auto-reply fax to 518 449 0047 COMPANY:

Auto-Reply Facsimile Transmission

VGK 8/22/06

TO: Fax Sender at 518 449 0047

Fax Information
Date Received: 8/21/2006 1:59:26 PM [Eastern Daylight Time]
Total Pages: 14 (including cover page)

ADVISORY: This is an automatically generated return receipt confirmation of the facsimile transmission received by the Office. Please check to make sure that the number of pages listed as received in Total Pages above matches what was intended to be sent. Applicants are advised to retain this receipt in the unlikely event that proof of this facsimile transmission is necessary. Applicants are also advised to use the certificate of facsimile transmission procedures set forth in 37 CFR 1.8(a) and (b), 37 CFR 1.6(f). Trademark Applicants, also see the Trademark Manual of Examining Procedure (TMEP) section 306 et seq.

Received Cover Page ========>

AUG.21'2006 13:56 518 449 0047 HOFFMAN WARNICK D ALESSANRO LLC 0010 P.001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No.:	09/710,947	**Conf. No.:**	4946
Filing Date:	08/13/2004	**Art Unit:**	2858
Applicant:	Chudzik et al.	**Examiner:**	He, Amy
Title:	METHOD FOR THE DETERMINATION OF FILM CONTINUITY IN THIN DIELECTRIC FILM	**Docket No.:**	FIS920040092US2 IBMF-0069

COMMISSIONER FOR PATENTS

DESTINATION FACSIMILE NUMBER: 571-273-8300

Transmitted herewith is: **Amendment in 13 pages**

In the above identified application.

CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office on the date shown below.

Linda T. Segarsee
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Signature August 21, 2006
Date

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PAGE 1/14 * RCVD AT 8/21/2006 1:59:26 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/35 * DNIS:2738300 * CSID:518 449 0047 * DURATION (mm-ss):09-44

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No.: 09/710,947	**Conf. No.:** 4946
Filing Date: 08/13/2004	**Art Unit:** 2858
Applicant: Chudzik et al.	**Examiner:** He, Amy
Title: METHOD FOR THE DETERMINATION OF FILM CONTINUITY IN THIN DIELECTRIC FILM	**Docket No.:** FIS920040082US2 IBMF-0066

COMMISSIONER FOR PATENTS

DESTINATION FACSIMILE NUMBER: 571-273-8300

Transmitted herewith is: **Amendment in 13 pages**

In the above identified application.

CERTIFICATION OF FACSIMILE TRANSMISSION

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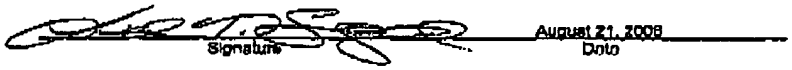
Linda T. Sagerese
(Person transmitting this correspondence)



Signature August 21, 2006
Date

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TX RESULT REPORT

NAME:HOFFMAN WARNICK D ALESSANRO LLC
TEL :518 449 0047
DATE:AUG.21'2006 13:10

SESSION	FUNCTION	NO.	DESTINATION STATION	DATE	TIME	PAGE	DURATION	MODE	RESULT
1185	TX	01	USPTO 915712738300	AUG.21	13:06	014	00H03'34"	ECM	OK

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No.:	09/710,947	**Conf. No.:**	4946
Filing Date:	08/13/2004	**Art Unit:**	2858
Applicant:	Chudzik et al.	**Examiner:**	He, Amy
Title:	METHOD FOR THE DETERMINATION OF FILM CONTINUITY IN THIN DIELECTRIC FILM	**Docket No.:**	FIS920040092US2 IBMF-0066

COMMISSIONER FOR PATENTS

DESTINATION FACSIMILE NUMBER: 571-273-8300

Transmitted herewith is: **Amendment in 13 pages**

in the above identified application.

CERTIFICATION OF FACSIMILE TRANSMISSION

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Linda T. Sagarese
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Chudzik et al.	**Conf. No.:**	4946
Serial No.:	09/710,947	**Art Unit:**	2858
Filing Date:	08/13/2004	**Examiner:**	HE, Amy
Title:	METHOD FOR THE DETERMINATION OF FILM CONTINUITY IN THIN DIELECTRIC FILM	**Docket No.:**	FIS920040092US2 (IBMF-0066)

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENTS UNDER 37 CFR §1.111

Sir:

I. INTRODUCTORY COMMENTS:

In response to the Office Action mailed on May 23, 2006, Applicants proposes to amend the above-referenced patent application as follows:

Amendments to the specification, specifically the abstract, begins on page 2 of this response.

Listing of the claims are shown on page 3 of this response.

Remarks begins on page 8 of this response.

II. AMENDMENTS TO THE SPECIFICATION:

Please make the following amendments to the abstract of the specification:

On page 19, line 7, please amend as follows:

The continuity determining method ~~comprises~~ includes: depositing a material on the substrate using a first value of a growth metric; depositing an amount of charge on a surface of the material; repetitively measuring a surface voltage of the material until an onset of tunneling to provide a Vtunnel (or Etunnel) value; repeating the above steps for different values of the growth metric; and comparing the Vtunnel (or Etunnel) values for different values of the growth metric to provide a measure of the continuity of the material on the substrate.

III. LISTING OF THE CLAIMS

The following is a listing of claims to replace all prior versions and listings of claims in the application:

1. (Original) A method for determining continuity of a material on a substrate, comprising:

depositing the material on the substrate using a first value of a growth metric;

depositing an amount of charge on a surface of the material;

repeatedly measuring a surface voltage of the material until an onset of tunneling to provide a Vtunnel value;

repeating the above steps for different values of the growth metric; and

comparing the Vtunnel values for different values of the growth metric to provide a measure of the continuity of the material on the substrate.

2. (Original) The method of claim 1, wherein the step of comparing the Vtunnel values further comprises:

determining a transition between a linear region and a non-linear region of the Vtunnel values, wherein the linear region corresponds to layer-by-layer growth of the material on the substrate, and wherein the non-linear region corresponds to islanded growth of the material on the substrate.

3. (Original) The method of claim 1, wherein the growth metric is selected from the group consisting of thickness, time, precursor cycles, and temperature.

4. (Original) The method of claim 1, wherein the material is deposited on the substrate using Atomic Layer Deposition (ALD).

5. (Original) The method of claim 1, wherein a fixed amount of charge is deposited on the surface of the material.

6. (Original) The method of claim 1, wherein the method is non-destructive and can be used in-line.

7. (Original) The method of claim 1, wherein the material is a high-k dielectric material.

8. (Original) The method of claim 1, wherein the step of comparing the Vtunnel values further comprises:

identifying optimum growth conditions for layer-by-layer deposition of the material on the substrate.

9. (Original) The method of claim 1, further comprising:

determining a growth mode of the material on the substrate.

10. (Original) The method of claim 9, wherein the step of determining a growth mode of the material on the substrate further comprises:

comparing a first derivative of a Vtunnel per growth metric curve versus the growth metric; and

examining a linearity of results of the comparison to determine the growth mode

of the material on the substrate, wherein a linear region corresponds to a layer-by-layer growth mode of the material on the substrate, and wherein the non-linear region corresponds to an islanded growth mode of the material on the substrate.

11. (Original) The method of claim 1, further comprising the steps of:

dividing each Vtunnel value by a constant thickness value to provide an Etunnel value; and

comparing the Etunnel values for different values of the growth metric to provide a measure of the continuity of the material on the substrate.

12. (Original) The method of claim 11, wherein the step of comparing the Etunnel values further comprises:

determining a transition between a linear region and a non-linear region of the Etunnel values, wherein the linear region corresponds to layer-by-layer growth of the material on the substrate, and wherein the non-linear region corresponds to islanded growth of the material on the substrate.

13. (Original) The method of claim 11, wherein the step of comparing the Etunnel values further comprises:

identifying optimum growth conditions for layer-by-layer deposition of the material on the substrate.

14. (Original) The method of claim 11, further comprising:

determining a growth mode of the material on the substrate.

15. (Original) The method of claim 14, wherein the step of determining a growth mode of the material on the substrate further comprises:

comparing a first derivative of an Etunnel per growth metric curve versus the growth metric; and

examining a linearity of results of the comparison to determine the growth mode of the material on the substrate, wherein a linear region corresponds to a layer-by-layer growth mode of the material on the substrate, and wherein the non-linear region corresponds to an islanded growth mode of the material on the substrate.

16. (Original) A method for determining a growth mode of a material on a substrate, comprising:

depositing the material on the substrate using a first value of a growth metric;

depositing an amount of charge on a surface of the material;

repeatedly measuring a surface voltage of the material until an onset of tunneling to provide a Vtunnel value;

repeating the above steps for different values of the growth metric; and

comparing a first derivative of a Vtunnel per growth metric curve versus the growth metric to determine the growth mode of the material on the substrate.

17. (Original) The method of claim 16, further comprising the steps of:

dividing each Vtunnel value by a constant thickness value to provide an Etunnel value; and

comparing a first derivative of an Etunnel per growth metric curve versus the

growth metric to determine the growth mode of the material on the substrate.

18. (Original) The method of claim 16, wherein the growth metric is selected from the group consisting of thickness, time, precursor cycles, and temperature.

19. (Original) The method of claim 16, further comprising:

examining a linearity of results of the comparison to determine the growth mode of the material on the substrate, wherein a linear region corresponds to a layer-by-layer growth mode of the material on the substrate, and wherein the non-linear region corresponds to an islanded growth mode of the material on the substrate.

20. (Original) A system for determining continuity and growth mode of a material deposited on a substrate, comprising:

means for depositing an amount of charge on a surface of the material;

means for repeatedly measuring a surface voltage of the material until an onset of tunneling to provide a Vtunnel value; and

means for determining the continuity and growth mode of the material using Vtunnel values obtained for different values of a growth metric.

IV. REMARKS

Applicants have considered the current Office Action mailed on May 23, 2006.

Claims 1-20 are pending in this application and are rejected in the current Office Action. In response to the current Office Action, Applicants have amended the abstract. Applicants do not acquiesce in the correctness of the rejections and reserve the right to present specific arguments regarding any rejected claims not specifically addressed. Further, Applicants reserve the right to pursue the full scope of the subject matter of the original claims in a subsequent patent application that claims priority to the instant application. Reconsideration in view of the following remarks is respectfully requested.

In the Office Action, the specification was objected to because it contained the informal phrase "comprises" in line 4 of the abstract. Applicants have amended the abstract to replace the same phrase with "includes" as suggested by the Office. Accordingly, Applicants believe that the abstract is now placed in order and respectfully request the Office to remove the objection.

The Office rejected claims 1-3, 5-7, 9-12, 14-20 under 35 U.S.C. §103(a) as allegedly being unpatentable over Xu et al. (US Patent No. 6,759,255), hereinafter "Xu". The Office also rejected claims 4, 8 and 13 under 35 U.S.C. §103(a) as allegedly being unpatentable over Xu in view of Jursich et al. (US Pub. No. 2005/0003662), hereinafter "Jursich". Applicants respectfully traverse the §103(a) rejections and assert that the claims are patentable over Xu independently or in combination with Jursich.

Independent claim 1 and 20 recites, *inter alia*, a method/system for determining the continuity of a material on a substrate by "...comparing the Vtunnel values for different values of the growth metric...".

Xu discloses a method for detecting metal contamination on a semiconductor through the use of tunneling voltage, Vtunnel, values. Specifically, Xu relies on Vtunnel values, characteristic of each material, as a means to distinguish a metal from a dielectric or another metal for detecting metal contamination (col. 7, line 45 – 46 and col. 8, line 8 – 9).

The Office has relied on the rationale in col. 1, line 43 – col. 2, line 43 of the Background in Xu for support in contending that it would have been obvious to a skilled person to modify Xu to determine continuity and/or growth mode/thickness of the material on the substrate. Applicants do not agree with this rationale. As noted by the Office, Xu "does not specifically disclose that the characteristic of the material determined is the continuity of the material on the substrate". While the characteristic of a metal/material may provide a means for distinguishing a metal from another material/metal to detect contamination, the same characteristic does not provide a measure on continuity of a material on a substrate.

According to independent claim 1, a measure of the continuity of the material on the substrate involves "...comparing Vtunnel values for different values of growth metric". Xu does not disclose the use of growth metric in relation to the use of Vtunnel. Instead, Xu's method directs a skilled person towards consideration of using Vtunnel values for identifying and distinguishing metals/material but not the use of "...Vtunnels values for different values of growth metric". Without the consideration of such use, the focus of Xu's method is more likely to lead a person away from the claimed invention then to motivate modification of Xu's teachings for determining continuity of a material on a substrate. Accordingly, Applicants assert that it would not have occurred to a

skilled person to look to methods that teaches detecting metal contamination for determining continuity of growth of the material on a substrate.

Independent claim 1 and 20 further provide, *inter alia*, a repeating step for "repeatedly measuring ...to provide a Vtunnel value" "...for different values of the growth metric".

Contrary to the Office's opinion on page 3, line 2 of the current Office Action, Applicants asserts that Xu uses the Vtunnel values, characteristic of that particular metal, to determine its presence as a contaminant but does not provide a repeating step for "repeatedly measuring... a Vtunnel value" "for different values of the growth metric", as claimed in claim 1 and 20. Without applying Vtunnel values according to this method step of the claimed invention, a skilled person would not be able to measure the continuity or growth mode of a material. This deficiency in Xu is not addressed by the Office with factual support as to how such a skilled person would be motivated to modify the teachings in Xu to arrive at the claimed method/system for measuring continuity of a material on a substrate. The method steps in Xu for determining metal contamination do not necessarily mean an expedient modification would lead to a method step for measuring continuity/growth mode of a material. Therefore, Xu does not render the claimed invention obvious to a skilled person because a skilled person would not have found any motivation to modify the teachings therein.

The Office also does not explain how the skilled person, by detecting the interested characteristics of the dielectric material, for example, Vtunnel values that are characteristic of a metal/material, is able to determine the continuity/growth of the material. Method steps for detecting metal contamination with the use of Vtunnel values are different from method steps for determining continuity/growth mode of a

particular material on a substrate. Therefore, Applicants believe that a skilled person would not make the modification proposed by the Examiner. A more persuasive motivation is needed to make this a desirable modification.

According to the preceding paragraphs, the Office has not provided factual support to establish a *prima facie* case of obviousness with Xu, which does not suggest the desirability of "...comparing Vtunnel values for different values of growth metric to provide a measure of continuity/growth mode". Since Xu has provided no motivation to modify, it appears as if the Office's §103(a) rejection may have been based on hindsight to derive a motivation to modify Xu. Applicants would like to respectfully remind the Office that it is impermissible to use the Applicant's specification as a template to derive a motivation.

Applicant respectfully request the Office's reconsideration of the independent claims 1 and 20 and consequently all respective claims dependent thereon. Applicants further submit that Xu does not disclose the growth metric, being any one of "thickness, time, precursor cycles, and temperature" set out in dependent claim 3, which further distinguishes the claimed invention from Xu.

Turning to the rejection of claims 2, 10, 12 and 15 – 19, the Office stated that a skilled person would be able to modify the teachings in Xu to achieve the claimed invention. However, the Office has not provided factual support indicating how it would be obvious to a skilled person to modify Xu to compare the first derivative of a Vtunnel/Etunnel per growth metric curve versus the growth metric to determine the growth mode of the material on the substrate. Specifically, the Office notes on page 3 of the current Office Action, that Xu lacks the step of "...comparing a first derivative of the Vtunnel/Etunnel per growth metric curve versus the growth metric ..." refutes that

the claimed invention, recited in independent claim 16, is obvious in view of Xu. Furthermore, the Office's note that Xu lacks the step, of "...determining a transition between a linear region and a non-linear region of the Vtunnel/Etunnel values, ..." recited in dependent claim 2 and 11, lends additional support that the claimed invention is not obvious on reading Xu's method. Since Xu is deficient in providing the aforementioned steps, a skilled person would not have looked to Xu's method to determine the continuity/growth mode of a material on a substrate set out in the claims.

The Office opined that a skilled person would recognize a transition between a linear region and a non-linear region but does not explain how or on what basis such a skilled person would recognize the transition from the layer-by-layer growth to that of islanded growth of the material on the substrate.

Applicants herein incorporate the arguments above with regard to the Office's other arguments regarding all dependent claims and submit that they are allowable based the forgoing arguments and on their own distinct features. However, for brevity, Applicants will forego addressing each of these rejections individually, but reserves the right to do so should it become necessary. Applicants respectfully assert that the Office has failed to establish any support for a *prima facie* case of the obviousness rejection under 35 U.S.C. §103(a) in view of Xu independently or in combination with Jursich. Accordingly, Applicants respectfully request that the Office withdraw its rejection.

V. CONCLUSION

Applicants respectfully submit that the Application as presented is in condition for allowance. Should the Examiner believe that anything further is necessary in order to place the application in better condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

Spencer K. Warnick
Reg. No. 40,398

Date: 8/21/06

Hoffman, Warnick and D'Alessandro, LLC
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Albany, New York 12207
Phone:(518) 449-0044
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SKW/TC

EXIBIT "B"

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Chudzik et al.	**Conf. No.:**	4946
Serial No.:	10/710,947	**Art Unit:**	2858
Filing Date:	08/13/2004	**Examiner:**	HE, Amy
Title:	METHOD FOR THE DETER-MINATION OF FILM CONTINUITY IN THIN DIELECTRIC FILM	**Docket No.:**	FIS920040092US2 (IBMF-0066)

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT UNDER 37 CFR §1.111

Sir:

I. INTRODUCTORY COMMENTS:

In response to the Office Action mailed on May 23, 2006, Applicants proposes to amend the above-referenced patent application as follows:

Amendments to the specification, specifically the abstract, begins on page 2 of this response.

Listing of the claims are shown on page 3 of this response.

Remarks begins on page 8 of this response.

II. AMENDMENTS TO THE SPECIFICATION:

Please make the following amendments to the abstract of the specification:

On page 19, line 7, please amend as follows:

The continuity determining method ~~comprises~~ includes: depositing a material on the substrate using a first value of a growth metric; depositing an amount of charge on a surface of the material; repetitively measuring a surface voltage of the material until an onset of tunneling to provide a Vtunnel (or Etunnel) value; repeating the above steps for different values of the growth metric; and comparing the Vtunnel (or Etunnel) values for different values of the growth metric to provide a measure of the continuity of the material on the substrate.

III. LISTING OF THE CLAIMS

The following is a listing of claims to replace all prior versions and listings of claims in the application:

1. (Original) A method for determining continuity of a material on a substrate, comprising:

depositing the material on the substrate using a first value of a growth metric;

depositing an amount of charge on a surface of the material;

repeatedly measuring a surface voltage of the material until an onset of tunneling to provide a Vtunnel value;

repeating the above steps for different values of the growth metric; and

comparing the Vtunnel values for different values of the growth metric to provide a measure of the continuity of the material on the substrate.

2. (Original) The method of claim 1, wherein the step of comparing the Vtunnel values further comprises:

determining a transition between a linear region and a non-linear region of the Vtunnel values, wherein the linear region corresponds to layer-by-layer growth of the material on the substrate, and wherein the non-linear region corresponds to islanded growth of the material on the substrate.

3. (Original) The method of claim 1, wherein the growth metric is selected from the group consisting of thickness, time, precursor cycles, and temperature.

4. (Original) The method of claim 1, wherein the material is deposited on the substrate using Atomic Layer Deposition (ALD).

5. (Original) The method of claim 1, wherein a fixed amount of charge is deposited on the surface of the material.

6. (Original) The method of claim 1, wherein the method is non-destructive and can be used in-line.

7. (Original) The method of claim 1, wherein the material is a high-k dielectric material.

8. (Original) The method of claim 1, wherein the step of comparing the Vtunnel values further comprises:

identifying optimum growth conditions for layer-by-layer deposition of the material on the substrate.

9. (Original) The method of claim 1, further comprising:

determining a growth mode of the material on the substrate.

10. (Original) The method of claim 9, wherein the step of determining a growth mode of the material on the substrate further comprises:

comparing a first derivative of a Vtunnel per growth metric curve versus the

growth metric; and

examining a linearity of results of the comparison to determine the growth mode of the material on the substrate, wherein a linear region corresponds to a layer-by-layer growth mode of the material on the substrate, and wherein the non-linear region corresponds to an islanded growth mode of the material on the substrate.

11. (Original) The method of claim 1, further comprising the steps of:

dividing each Vtunnel value by a constant thickness value to provide an Etunnel value; and

comparing the Etunnel values for different values of the growth metric to provide a measure of the continuity of the material on the substrate.

12. (Original) The method of claim 11, wherein the step of comparing the Etunnel values further comprises:

determining a transition between a linear region and a non-linear region of the Etunnel values, wherein the linear region corresponds to layer-by-layer growth of the material on the substrate, and wherein the non-linear region corresponds to islanded growth of the material on the substrate.

13. (Original) The method of claim 11, wherein the step of comparing the Etunnel values further comprises:

identifying optimum growth conditions for layer-by-layer deposition of the material on the substrate.

14. (Original) The method of claim 11, further comprising:

determining a growth mode of the material on the substrate.

15. (Original) The method of claim 14, wherein the step of determining a growth mode of the material on the substrate further comprises:

comparing a first derivative of an Etunnel per growth metric curve versus the growth metric; and

examining a linearity of results of the comparison to determine the growth mode of the material on the substrate, wherein a linear region corresponds to a layer-by-layer growth mode of the material on the substrate, and wherein the non-linear region corresponds to an islanded growth mode of the material on the substrate.

16. (Original) A method for determining a growth mode of a material on a substrate, comprising:

depositing the material on the substrate using a first value of a growth metric;

depositing an amount of charge on a surface of the material;

repeatedly measuring a surface voltage of the material until an onset of tunneling to provide a Vtunnel value;

repeating the above steps for different values of the growth metric; and

comparing a first derivative of a Vtunnel per growth metric curve versus the growth metric to determine the growth mode of the material on the substrate.

17. (Original) The method of claim 16, further comprising the steps of:

dividing each Vtunnel value by a constant thickness value to provide an Etunnel value; and

comparing a first derivative of an Etunnel per growth metric curve versus the growth metric to determine the growth mode of the material on the substrate.

18. (Original) The method of claim 16, wherein the growth metric is selected from the group consisting of thickness, time, precursor cycles, and temperature.

19. (Original) The method of claim 16, further comprising:

examining a linearity of results of the comparison to determine the growth mode of the material on the substrate, wherein a linear region corresponds to a layer-by-layer growth mode of the material on the substrate, and wherein the non-linear region corresponds to an islanded growth mode of the material on the substrate.

20. (Original) A system for determining continuity and growth mode of a material deposited on a substrate, comprising:

means for depositing an amount of charge on a surface of the material;

means for repeatedly measuring a surface voltage of the material until an onset of tunneling to provide a Vtunnel value; and

means for determining the continuity and growth mode of the material using Vtunnel values obtained for different values of a growth metric.

IV. REMARKS

Applicants have considered the current Office Action mailed on May 23, 2006.

Claims 1-20 are pending in this application and are rejected in the current Office Action. In response to the current Office Action, Applicants have amended the abstract. Applicants do not acquiesce in the correctness of the rejections and reserve the right to present specific arguments regarding any rejected claims not specifically addressed. Further, Applicants reserve the right to pursue the full scope of the subject matter of the original claims in a subsequent patent application that claims priority to the instant application. Reconsideration in view of the following remarks is respectfully requested.

In the Office Action, the specification was objected to because it contained the informal phrase "comprises" in line 4 of the abstract. Applicants have amended the abstract to replace the same phrase with "includes" as suggested by the Office. Accordingly, Applicants believe that the abstract is now placed in order and respectfully request the Office to remove the objection.

The Office rejected claims 1-3, 5-7, 9-12, 14-20 under 35 U.S.C. §103(a) as allegedly being unpatentable over Xu et al. (US Patent No. 6,759,255), hereinafter "Xu". The Office also rejected claims 4, 8 and 13 under 35 U.S.C. §103(a) as allegedly being unpatentable over Xu in view of Jursich et al. (US Pub. No. 2005/0003662), hereinafter "Jursich". Applicants respectfully traverse the §103(a) rejections and assert that the claims are patentable over Xu independently or in combination with Jursich.

Independent claim 1 and 20 recites, *inter alia*, a method/system for determining the continuity of a material on a substrate by "...comparing the Vtunnel values for different values of the growth metric...".

Xu discloses a method for detecting metal contamination on a semiconductor through the use of tunneling voltage, Vtunnel, values. Specifically, Xu relies on Vtunnel values, characteristic of each material, as a means to distinguish a metal from a dielectric or another metal for detecting metal contamination (col. 7, line 45 – 46 and col. 8, line 8 – 9).

The Office has relied on the rationale in col. 1, line 43 – col. 2, line 43 of the Background in Xu for support in contending that it would have been obvious to a skilled person to modify Xu to determine continuity and/or growth mode/thickness of the material on the substrate. Applicants do not agree with this rationale. As noted by the Office, Xu "does not specifically disclose that the characteristic of the material determined is the continuity of the material on the substrate". While the characteristic of a metal/material may provide a means for distinguishing a metal from another material/metal to detect contamination, the same characteristic does not provide a measure on continuity of a material on a substrate.

According to independent claim 1, a measure of the continuity of the material on the substrate involves "...comparing Vtunnel values for different values of growth metric". Xu does not disclose the use of growth metric in relation to the use of Vtunnel. Instead, Xu's method directs a skilled person towards consideration of using Vtunnel values for identifying and distinguishing metals/material but not the use of "...Vtunnels values for different values of growth metric". Without the consideration of such use, the focus of Xu's method is more likely to lead a person away from the claimed invention then to motivate modification of Xu's teachings for determining continuity of a material on a substrate. Accordingly, Applicants assert that it would not have occurred to a

skilled person to look to methods that teaches detecting metal contamination for determining continuity of growth of the material on a substrate.

Independent claim 1 and 20 further provide, *inter alia*, a repeating step for "repeatedly measuring ...to provide a Vtunnel value" "...for different values of the growth metric".

Contrary to the Office's opinion on page 3, line 2 of the current Office Action, Applicants asserts that Xu uses the Vtunnel values, characteristic of that particular metal, to determine its presence as a contaminant but does not provide a repeating step for "repeatedly measuring... a Vtunnel value" "for different values of the growth metric", as claimed in claim 1 and 20. Without applying Vtunnel values according to this method step of the claimed invention, a skilled person would not be able to measure the continuity or growth mode of a material. This deficiency in Xu is not addressed by the Office with factual support as to how such a skilled person would be motivated to modify the teachings in Xu to arrive at the claimed method/system for measuring continuity of a material on a substrate. The method steps in Xu for determining metal contamination do not necessarily mean an expedient modification would lead to a method step for measuring continuity/growth mode of a material. Therefore, Xu does not render the claimed invention obvious to a skilled person because a skilled person would not have found any motivation to modify the teachings therein.

The Office also does not explain how the skilled person, by detecting the interested characteristics of the dielectric material, for example, Vtunnel values that are characteristic of a metal/material, is able to determine the continuity/growth of the

material. Method steps for detecting metal contamination with the use of Vtunnel values are different from method steps for determining continuity/growth mode of a particular material on a substrate. Therefore, Applicants believe that a skilled person would not make the modification proposed by the Examiner. A more persuasive motivation is needed to make this a desirable modification.

According to the preceding paragraphs, the Office has not provided factual support to establish a *prima facie* case of obviousness with Xu, which does not suggest the desirability of "...comparing Vtunnel values for different values of growth metric to provide a measure of continuity/growth mode". Since Xu has provided no motivation to modify, it appears as if the Office's §103(a) rejection may have been based on hindsight to derive a motivation to modify Xu. Applicants would like to respectfully remind the Office that it is impermissible to use the Applicant's specification as a template to derive a motivation.

Applicant respectfully request the Office's reconsideration of the independent claims 1 and 20 and consequently all respective claims dependent thereon. Applicants further submit that Xu does not disclose the growth metric, being any one of "thickness, time, precursor cycles, and temperature" set out in dependent claim 3, which further distinguishes the claimed invention from Xu.

Turning to the rejection of claims 2, 10, 12 and 15 – 19, the Office stated that a skilled person would be able to modify the teachings in Xu to achieve the claimed invention. However, the Office has not provided factual support indicating how it would be obvious to a skilled person to modify Xu to compare the first derivative of a Vtunnel/Etunnel per growth metric curve versus the growth metric to determine the

growth mode of the material on the substrate. Specifically, the Office notes on page 3 of the current Office Action, that Xu lacks the step of "...comparing a first derivative of the Vtunnel/Etunnel per growth metric curve versus the growth metric ..." refutes that the claimed invention, recited in independent claim 16, is obvious in view of Xu. Furthermore, the Office's note that Xu lacks the step, of "...determining a transition between a linear region and a non-linear region of the Vtunnel/Etunnel values, ..." recited in dependent claim 2 and 11, lends additional support that the claimed invention is not obvious on reading Xu's method. Since Xu is deficient in providing the aforementioned steps, a skilled person would not have looked to Xu's method to determine the continuity/growth mode of a material on a substrate set out in the claims.

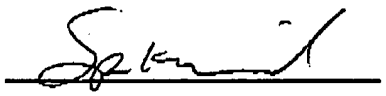
The Office opined that a skilled person would recognize a transition between a linear region and a non-linear region but does not explain how or on what basis such a skilled person would recognize the transition from the layer-by-layer growth to that of islanded growth of the material on the substrate.

Applicants herein incorporate the arguments above with regard to the Office's other arguments regarding all dependent claims and submit that they are allowable based the forgoing arguments and on their own distinct features. However, for brevity, Applicants will forego addressing each of these rejections individually, but reserves the right to do so should it become necessary. Applicants respectfully assert that the Office has failed to establish any support for a *prima facie* case of the obviousness rejection under 35 U.S.C. §103(a) in view of Xu independently or in combination with Jursich. Accordingly, Applicants respectfully request that the Office withdraw its rejection.

V. CONCLUSION

Applicants respectfully submit that the Application as presented is in condition for allowance. Should the Examiner believe that anything further is necessary in order to place the application in better condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,



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